Institute of Physics

(An Autonomous Research Institute of Dept. of Atomic Energy, Govt. of India)
P:O: Sainik School, Bhubaneswar – 751 005, India

GLOBAL TENDER NOTICE NO. 01/2009-10

Last date of receipt of the sealed quotations: Upto 3 P.M. of 30.10.2009

Sealed quotations are invited from leading manufacturers and / or their accredited associates for supply, installation, testing & commissioning of

1. **DC/RF Sputter Target Materials**
2. **Microforge for Glass capillaries**
3. **Vibration Isolation Table**
4. **Microelectrode/ Pipette Puller (Programmable)**
5. **Patch Clam Amplifier**
6. **High Resolution XRD Set up**
7. **KrF Excimer Laser**
8. **PLD Chamber & Accessories**

Detailed technical specifications and other terms & conditions for supply of the above items/ equipments can be obtained by downloading the same from the Institute's official website: www.iopb.res.in . Quotations for all the items as mentioned above (except Sl. No.-1) should be submitted in sealed envelopes in two parts separately, i.e. "Technical bid" (Part- A) & "Financial bid" (Part-B). Both the parts should be further sealed in an envelope superscribing the name of the item, tender No. & should be address to "The Director, Institute of Physics, Near Sainik School, Bhubaneswar- 751005, Orissa. The technical bids will be opened on **03.11.2009** at 11.00 AM. The price bids of the only technically qualified bidders will be opened at a later date with prior intimation to the respective bidders.

The Institute reserves the right to accept or reject any or all quotations either in full or in part without assigning any reasons thereof.

REGISTRAR

DETAILED SPECIFICATION:-

Sl No.- 1: **Name of sputter targets and dimensions (along with purity):**

1. Aluminum [99.999%], 2 in. dia., 0.25 in. thick
2. Bismuth [99.99% or better], 2 in. dia., 0.125-0.25 in. thick
3. Carbon (Graphite) [99.999%], 2 in. dia., 0.125-0.25 in. thick
4. Copper [99.99% or better], 2 in. dia., 0.25 in. thick
5. Cobalt [99.95% or better], 2 in. dia., 3 mm thick
6. Chromium [99.95% or better], 2 in. dia., 0.25 in. thick
7. Europium [99.9% or better], 2 in. dia., 0.125-0.25 in. thick
8. Gadolinium [99.9% or better], 2 in. dia., 0.125-0.25 in. thick
9. Germanium [99.999% or better], 2 in. dia., 0.125-0.25 in. thick
10. Gold [99.99% or better], 2 in. dia., 0.125-0.25 in. thick
11. Indium [99.99% or better], 2 in. dia., 0.125-0.25 in. thick
12. Iron [99.95% or better], 2 in. dia., 3 mm thick
13. Magnesium [99.95% or better] , 2 in. dia., 0.25 in. thick
14. Molybdenum [99.99% or better] , 2 in. dia., 0.25 in. thick
15. Manganese [99.9% or better], 2 in. dia., 0.125-0.25 in. thick
16. Nickel [99.99% or better], 2 in. dia., 3 mm thick
17. Platinum [99.99% or better], 1-2 in. dia., 0.125-0.25 in. thick
18. Palladium [99.95% or better], 2 in. dia., 0.125-0.25 in. thick
19. Silicon [99.999%], 2 in. dia., 0.25 in. thick
20. Silver [99.99%], 2 in. dia., 0.25 in. thick
21. Tin [99.995% or better], 2 in. dia., 0.25 in. thick
22. Tantalum [99.99% or better], 2 in. dia., 0.25 in. thick
23. Titanium [99.995% or better], 2 in. dia., 0.25 in. thick
24. Telurium [99.95% or better], 2 in. dia., 0.25 in. thick
25. Tungsten [99.95% or better], 2 in. dia., 0.25 in. thick
26. Zinc [99.95% or better], 2 in. dia., 0.25 in. thick
27. AlN [99.8% or better], 2 in. dia., 0.25 in. thick
28. Al_2O_3 [99.99% or better], 2 in. dia., 0.125-0.25 in. thick
29. BN [99.99% or better], 2 in. dia., 0.125-0.25 in. thick
30. CdS [99.99% or better], 2 in. dia., 0.125-0.25 in. thick
31. CdSe [99.99% or better], 2 in. dia., 0.125-0.25 in. thick
32. CdTe [99.99% or better], 2 in. dia., 0.125-0.25 in. thick
33. CoO [99.7% or better], 2 in. dia., 0.125-0.25 in. thick
34. CuO [99.7% or better], 2 in. dia., 0.125-0.25 in. thick
35. Cr_2O_3 [99.8% or better], 2 in. dia., 0.125-0.25 in. thick
36. Co/Fe 10 at.% [99.95% or better], 2 in. dia., 3 mm thick
37. Co-Cr-Pt Ternary alloy sources: All possible combinations of Co, Cr, and Pt [99.95% or better], 2 in. dia., 3 mm thick
38. Fe_3Al [99.95% or better], 2 in. dia., 0.125-0.25 in. thick
39. Fe-Mn alloy targets
40. Fe_3Pt 25 at.% [99.95% or better], 2 in. dia., 3 mm thick
41. FePt or Fe25 at.%Pt_3 [99.95% or better], 2 in. dia., 3 mm thick

42. HfO_2 [99.95% or better], 2 in. dia., 0.125-0.25 in. thick
43. ITO [99.99% or better], 2 in. dia., 0.125-0.25 in. thick
44. MgO [99.95% or better], 2 in. dia., 0.125-0.25 in. thick
45. NiO [99.99% or better], 2 in. dia., 0.125-0.25 in. thick
46. $Ni_{81}Fe_{19}$ [99.95% or better], 2 in. dia., 3 mm thick
47. $Ni_{80}Fe_{20}$ [99.95% or better], 2 in. dia., 3 mm thick
48. PZT [99.95% or better], 2 in. dia., 0.125-0.25 in. thick
49. SiO_2 [99.995% or better], 2 in. dia., 0.125-0.25 in. thick
50. SnO_2 [99.995% or better], 2 in. dia., 0.125-0.25 in. thick
51. Si_3N_4 [99.9% or better], 2 in. dia., 0.125-0.25 in. thick
52. TiO_2 [99.5% or better] Rutile, 2 in. dia., 0.125-0.25 in. thick
53. TiN [99.5% or better], 2 in. dia., 0.125-0.25 in. thick
54. ZnO [99.99% or better], 2 in. dia., 0.125-0.25 in. thick
55. ZnO/Al_2O_3 2% wt.% [99.99% or better], 2 in. dia., 0.125-0.25 in. thick

For all the above mentioned materials, if the desired dimension or purity is not available, the closest possible product should be quoted.

Sl No.- 2 **Microforge**

Required for bending, cutting or fire-polishing microelectrodes, micropipettes.

Specifications:

1. Movement: Heater (XYZ: 15mm)
Pipette manipulator (X:10mm Z:25mm)
Microscope(X,Z: 5mm, Y:25mm)
2. Magnification: Eye piece (10x/15x) with micrometer.
objective (5x-10x).
3. Glass dia: 1-2 mm
Operating voltage: 220-240V AC
Warranty: 1 year (min).
Extended warranty/AMC charges to be quoted separately.
Accessories/spares/consumables (to be quoted separately if not part of standard package)
1. Heater (1)
2. Lamp (1)
3. Objective (30x or higher)

Sl No.- 3:- **Vibration isolation table**

Essential specifications

1. Pneumatic isolators (active damping not required).
2. Noiseless compressed air source.
3. Pressure indicators on individual legs.
4. Honey combed magnetic stainless steel top with metric mount holes.
5. Dimensions: 30"(D)x48"(W), working height 28"-32".
Thickness of work top: 2"-4" .
6. Load capacity: > 200kg (net).

7. Noise response: Resonance frequencies < 2Hz (Vert, Hor.)
Damping: > 98% at 10Hz.
(Noise transmittance graphs to be supplied)
Warranty: 1 Year (min)
Extended warranty/AMC charges to be quoted separately.
Accessories/spares/consumables (to be quoted separately, if not standard part):
1. Noiseless air pump (220V AC)(1)
2. Pressure regulator (1)
3. Support ring with arm rest
4. Support ring mount (2)
5. Faraday cage
6. Oil for air pump (20 cans)
7. Moisture Filters (4)

Sl No.-4 **Micro-electrode puller**

Required for producing microelectrodes/micropipettes
from aluminosilicate/borosilicate glass capillaries.
Essential specifications
1. Programmable with at least 50 programmes.
2. Solenoid puller (not gravity based).
3. Minimum capillary size: <1micron.
4. Operating voltage: 220-240V.
Warranty: 1yr (min), 3yr extended (to be specified).
Accessories/spares/consumables to be quoted separately:
1. Spare platinum filaments, box type (2).
2. Glass capillaries without filament (1.5mm OD) (10boxes).

Sl. No.- 5:- **Patch clamp amplifier**

Required for low noise measurement of single channel currents
in patch clamp set up.
Essential specifications:
1. Head stage: Currents up to +- 1 nA, capacitance up to 250pF.
2. Low noise (< 0.1pA at 1kHz, <0.5pA at 5kHz).
3. Bandwidth: 10kHz (with low pass filter built-in).
4. Capacitance measurement facility.
5. Gain telegraph.
6. Operating voltage: 220-240 V
Warranty: 1 year (min), 3 year extended (to be specified/quoted separately).

Sl No.: - 6 :-**Computer controlled High Resolution X-ray Diffractometer (XRD) for bulk and thin film applications :**

Institute of Physics (IOP), Bhubaneswar plans to purchase a High Resolution X-ray Diffraction (HRXRD) set up for the following main applications:

- Rocking Curve Measurement, Reflectivity

- Reciprocal Space Mapping
- Thin Film Diffraction
- Glancing Incidence Small Angle X-ray Scattering

The Instrument should be configured with high resolution optics on different samples.

Detailed Specification of the X-Ray Diffractometer:

1. X-ray Generator:

X-ray Generator with 3 kW power (with voltage ranging from 20-60 kV and current ranging from 5-80 mA) and in-built shutter. Stability of the X-Ray Generator should be ±0.005% per 10% variation of mains.

2. X-ray Source

Copper (Cu), Ceramic Insulation, 2.2 kW, Long Fine Focus, 1 line and 1 point focus.

3. High Resolution Vertical Goniometer

The Goniometer should be with independent Theta - 2Theta drives for accurate positioning.

Angular range: -10 degree to 165 degree 2 Theta,

Minimum Step size: +/- 0.0001 deg.

Angle reproducibility: +/- 0.0001 deg

Goniometer diameter: Variable from 500 mm and above with a provision for intermediate setting by user required for high resolution analysis.

4. Sample stage

Eulerian sample position cradle having motorized and software controlled χ (chi), Φ (phi) rotations and X, Y and Z translations, with following specifications :

• χ (chi), Range : -5 to 95 deg. or more, Accuracy: 0.001 deg .

• Φ (phi), Range : ± unlimited; Accuracy : ± 0.01 deg .

• X,Y Translation: -75 mm to +75 mm; Accuracy: ± 0.005 mm or better

• Z Translation: 2 mm or more (Accuracy: 0.01 mm or better)

- X,Y Oscillation - Simultaneous linear oscillations of the sample stage during rocking curve, topography,

Sample Holder– 5” Vacuum chuck for mounting of thin flat and bulk samples with capacity to hold sample weight up to 500gms.

5. X-Ray beam Optics:

• Optics should be suitable for Bragg-Brentano (BB) and parallel beam (PB) geometries

• Combination of Incident Beam Parabolic Multilayer Mirror with beam divergence less than 0.02 deg. and a Two Bounce **Ge 022** (Mirror-Bartel) Monochromator for pure Cu Kα1 X-ray beam. The assembly should provide high brilliant, parallel, line focus Cu-Kα1 monochromatic radiation

• Long Soller Slits with 0.12 deg. divergence for high resolution GIXRD

• Automatic beam attenuator and Knife edge collimator for XRR Applications

6. Secondary Optics: Dual beam path analyzer module typically for both high resolution and high intensity for reflectivity measurements and high resolution Thin Film analysis.

7. Detectors along with counting system

Very-fast solid state 1-Dimensional detector. It should not use any gas/LN in its operation. The detector must be able to operate in both fixed and scanning mode. Manufacturer certificate must be provided regarding it's capability for fixed mode operation. Necessary hardware & software must be in-built to reduce fluorescence, it must be able to work in both 0-Dimensional and 1-Dimensional modes. Necessary complete hardware and software must be offered. The active area of the detector must be large (preferably 14 mm X 16 mm) and not less than 14 mm X 14 mm (in and perpendicular to the scattering plane). Capture angle of the detector must be at least 3 degrees. The detector must be able to work with Cu, Mo and Cr radiation although it should be optimized for Cu-Kα radiation. Minimum global count rate should be $1x10^8$ cps. Counting efficiency of the detector must be higher than 96% for Cu radiation. Energy and spatial resolutions should be mentioned clearly. Detail specifications along with the features requested must be supported by printed catalogue from the manufacturer. In addition, an in-built solid state scintillation detector for high intensity signal detection (count rate $1x10^8$ cps or better) should be supplied (at no extra cost). All necessary power cables, power and signal cables, spacers, signal conditioning, and counting electronics should come with interface to the PC along with software.

The manufacturer should specify the limitations (if any) on the sample size and geometry, intensity and resolution of the instrument.

8. Radiation Safety Enclosure

A radiation safety enclosure needs to be provided with double safety protection circuits according to the prevailing international radiation safety regulations. Bright warning lamps for .X-rays on and in Service operation need to be mounted. High visibility and accessibility of the Goniometer through two folding doors with four large lead-glass windows need to be ensured. Under normal operational conditions these two folding doors need to be locked actively by incorporating an appropriate safety circuit. The above radiation safety enclosure shall be mounted atop a base cabinet. The base cabinet need to accommodate X-Ray generator, vacuum and cooling water circuitry, anode control, microprocessor based control units, NIM Bins and controllers for detectors and non-ambient temperature indicators.

9. Software

Software to fully control and configure the instrument, data acquisition, simulation and data analysis for all the applications listed above. ICDD PDF2 data base along with Search Match software for phase identification must be included in the basic system.

10. Computer system

A computer with Intel Core 2 Duo Processor, 3.0 GHz, 250 GB HDD, 2 GB RAM with 300 GB SATA/300 HDD.(7200 rpm or higher) (Seagate Make), Combo drive 52 X/32 X/52 X/ CD R/W & 16X DVD R/W, Speakers, Mike etc. to work with the integrated high definition audio, Integrated Intel GMA X3200 on board graphics, and 19" TFT monitor. Original Intel Motherboard (with

integrated audio). Pre-loaded WINDOWS XP and a Colour laser printer (with USB connections). Minimum 3 PCI connector slot , 1 no. PCI Express X 16 slots & 3 nos. PCI express X 1slot. PCI Express x16 Nvidia graphics card with 256 MB on board dedicated RAM. Integrated ultra DMA 33/ATA 66/100/133 and SATA/300 controller. Integrated 8 USB 2.0 ports (at least 2 USB ports shall be available in the front), 1 ECC Serial port (with D-Type 9 pin- connector) and 1 EPP Parallel port. Integrated 10/100/1000 Mbps auto sensing Ethernet Network Interface with Windows XP/Vista/Linux drivers and SNMP agent Software. Internet ready (~120 keys) PS/2 Keyboard with driver. Logitech/Microsoft Optical scroll Mouse on PS/2 Port with Mouse Pad and driver software.

11. Cooling system

A compatible external closed loop cooling unit should be provided with the X-ray generator.

12. Training

Installation and training will be done only by the factory engineers (minimum experience 3 years at factory site). The scientific staff and students will also be trained during installation at site free of cost.

13. UPS

Detailed technical specification for a 30 KVA Online UPS 3 phase input, 1 phase output with SMF batteries backup for providing uninterrupted data collection for 30 minutes should be provided separately. It may also be quoted as an optional item.

14. Warranty

12-36 months from the date of installation.

15. General:

(A) Input electrical power requirements should be as per the Indian electrical power conditions such as 220V/440V and 50 Hz for all the systems including the X-ray generator.

(B) The supplier shall be responsible for free installation and test run of the equipment with complete software applications. A complete set of detailed operating and service manuals (latest ones) in English should be provided.

(C) A good and efficient after sales service shall be provided for at least 10 years after commissioning of the equipment. Details of service centers/facilities available at supplier's end should be stated.

(D) A list of similar HRXRD systems supplied by the manufacturer in India should be provided.

(E) A list of recommended spare parts (along with their price), expected to be used for its

maintenance for at least 5 years should be provided separately under optional items. However, IOP has the right to purchase them partially or fully.

(F) Bidder has to provide all product brochures and compliance statement.

Sl No.- 7 & 8 :-

Specifications for Pulsed Excimer laser for Pulsed Laser Deposition (PLD)

Excimer Laser Specifications : -

- Type of Laser: KrF - 248nm wavelength
- Pulsed energy (mJ): 700 mJ or more /pulse @ 248 nm
- Max Repetition Rate: 10 Hz
- Average Power (W): 3 - 5 W @ 248 nm
- Pulse to Pulse stability : less than +/-1%
- Energy Stability: ± 1% or better
- Beam Divergence: 3×1 mrad
- Pulse Duration (ns): 20 ± 5 ns
- Timing Jitter: Less than ± 2 ns
- Laser Tube: Metal ceramic technology
- Gas life time: > 20 million shots from one fill@ KrF

Detail:

1) An external electrical trigger facility with TTL pulse and synchronous output in internal trigger operations.

2) A smooth ceramic pre-ionization for better pulse to pulse energy stability.

3) Electrostatic gas filter for internal gas purification system for extended operation of laser gas.

4) An internal laser pulse energy monitor and control for stable energy operation.

6) The laser system should be controlled through a remote control and should have RS 232 interface to control through computer.

7) The system should be air cooled and must operate at 230 VAC single phase.

8) Magnetic Assist Protection for Optimized discharge and long lifetime of Thyraton.

9) Window cleaning Interval > 100 million shots

10) Laser tube life should be greater than 1 billion shots.

11) All gases required for the operation should be quoted (as a separate item) with gas regulators for the proposed system. Supplier should clearly indicate the purity and quantity of each type of gas.

12) One set of Spare Parts Kit should be quoted as a separate item which should include Halogen filter (1 pc.), Varistors (2 pcs.), Fibre optic repair kit (1 pc.), High voltage trigger PCB (1 pc.), High voltage capacitor of appropriate capacity (2 pcs.), Rear mirror (1 pc.), Output coupler (1 pc.), O-ring set of appropriate dimension (2 pcs.), and Optics mount complete (2 nos.), Solenoid repair kit (2 pcs.).

12) Equipment should be guaranteed for a trouble free performance at the purchaser laboratory at least for a period of one year from the date of commissioning of the equipment.

13) External energy meter should be quoted separately.

14) All Technical literature/catalogs of various systems should accompany the quotation. All the documents should be in English.

15) Installation and commissioning should be provided by the supplier or its Indian agent. The Indian agent should have well proven service capability on similar systems.

16) A list of customers in India, where similar systems have been installed, must be provided.

Specifications for the PLD hardware

1) 12″ dia. SS vacuum chamber: Ports: 8″ OD (CF150) for substrate heater assembly. 8″ OD (CF150) for target flange, 8″ OD (CF 150), for top view port, 8″ OD CF150 for pump port, CF50 for laser port 2 nos. CF35 side view port 2 nos, CF35 for vacuum gauge, CF35 for view port for *in-situ* optical Characterization 2 nos, CF16 for gas and air inlet 2 nos.

One set of CF compatible Viton gaskets, All view ports will have toughened glass windows with aluminium covers, Air inlet and gas inlet valves with CF16 flanges.

2) Target flange: 8″ OD (CF 150) flange mounted with programmable stepper motor and DC/AC motor. Programmable Controller for stepper motor and DC/AC motor. The controller can index the targets as well as raster/rotate them in front of the laser beam. The number of targets is 6 nos. The controller also interfaces with the laser for multi-layer deposition (5V TTL signal). Contamination shield allowing only one target to be exposed to the laser at one time. All magnetic coupled movements, RS232 connection for Windows based operation with software and computer (to be provided by the user).

3) Gas flow assembly: For controlling the ambient gas as well as venting the chamber (including a mass flow controller and a 3 way ball valve).

4) Lens holder attachment: For X,Y,Z movement of lens. Should come with S1UV grade fused silica 2″ dia. lens and fused silica 2″ dia disc.

5) Spare heater, 2″ hot area: 2″ dia hot area cylindrical heater capable of operation in vacuum as well as in oxygen ambient (max. temperature up to 830 °C).

6) Steel frame: For mounting the chamber etc. (Powder coated Aluminium covers with Sunmica topped wooden top). Should be adjustable up and down by 1″. Castor wheels should be provided.

7) Gate valve: Stainless steel gate valve with CF150 (6″ OD) flanges. Bellow sealed shaft movement and gate viton O ring sealed.

8) Heater flange for large area samples: Fitted with a 2″ hot zone cylindrical flat plate heater capable of working at 830 °C (up to 10^{-6} Torr vacuum) in vacuum as well as in Oxygen ambient, embedded thermocouple. Attachment for clip mounting of substrates. Motorized rotation of the heater (maximum 360 degrees) and in and out movement after opening the chamber. Safety enclosure on the flange to conceal the heater wires, thermocouple wires. Shutter assembly magnetic coupled. All the above mounted on an 8″ OD (CF150) flange. Should include temperature controller (PID programmable having accuracy of ±1°C) with SCR firing circuit and multi profile (8 steps).

9) LN2 cooled substrate flange: Should be provided with the system

10) Laser table: For supporting laser

Commercial Terms & Conditions: -

1. **Price**: - The price mentioned above is Ex-Works/ FCA/ FOB including export packing, (this does not include the appropriate taxes)
2. **Destination**: - The consignment should be sent to **" The Director, Institute of Physics, P.O. Sainik School, Bhubaneswar-751005, INDIA"** on freight to pay (payable in Indian Currency) basis.
3. **Delivery**: - Delivery of the consignment should be made within ----------weeks from the date of issue of Letter of credit (L/C) either revocable or irrevocable.
4. **Payment**: - The payment will be released against Letter of Credit. You are required to issue an order confirmation letter in order to establish the L/C. 90% of the L/C value will be released on delivery of the consignment & balance 10% will be released after successful installation of the equipment.
5. **Details of the Consignment**: - You are required to submit the details of the consignment such as weight of the equipment, dimension of the packing & number of packets etc. at the time of order confirmation.
6. **Freight forwarder**: - The Institute will appoint the freight forwarder for forwarding & custom clearing of the consignment at the customs. The name of the freight forwarder will be intimated to the supplier at the time of opening of the L/C.
7. **Insurance**: - The transit Insurance of the consignment covering all risks and damages will be arranged by the Institute of Physics or its freight forwarder, duly authorized by the Institute
8. **Warranty**: - The equipment should be warranted for a period of --------- months from the date of successful delivery / commissioning at Institute's site. The necessary warranty certificate in this effect should be furnished along with the supply/ commissioning of the equipment. Spare parts in warranty period are required to be replaced on DDP(Destination Duty Paid) basis.
9. **Documents**: - The despatch documents along with the signed invoice copy & the copy of the airway bill (2 copies each) should be despatched through courier / faxed to the Institute immediately after the equipment is handed over to the freight forwarder.
10. **Bank Guaranty**: - You are required to submit a Performance Bank Guaranty equivalent to 10% of the equipment cost, valid for the entire warranty period issued by a nationalized Bank in favour of " Director, Institute of Physics, Bhubaneswar. The Bank Guaranty is required to be submitted at the time of order confirmation.

11. **Operational Manual**: - You are required to supply the operational manual of the equipment, circuitry diagrams etc. written in English only along with the consignment.
12. **Spare parts Manual**: - You are required to supply the operational manual of the equipment; circuitry diagrams etc. written in English only along with the consignment.
13. **Essential Spares/ consumables: -** Essential spares & Consumables along with the price list applicable for a period of 3/5/10 years are required to be supplied with the equipment & to be quoted separately.
14. **Shipment**: - Partial as well as Trans-shipment will not be strictly allowed.
15. **Agency Commission**: - No agency commission will be paid to any body / organization for this purchase.
16. **Banker**: - Our banker is Indian Overseas Bank, 121, New Station Square, Unit III, Bhubaneswar-751001, INDIA. You are required to specify the name of your Banker in order to release the payments.
17. **Training**: -
18. **Testing: -**
19. **Service support: -**
20. **Preventive Maintenance**: -
21. **Pre-Delivery Inspection:**
22. **Acceptance**: - If the terms & conditions mentioned above are acceptable to you, you are required to send the order confirmation letter along with a copy of this purchase order & details of consignment to the Institute within 02 weeks from the date of issue of the P.O. as a token of your acceptance.

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